REMARKS

The Examiner is thanked for the performance of a thorough search.

I. STATUS OF CLAIMS

Claims 16, 28, 29, and 30 have been amended. No claims have been added or canceled. Hence, Claims 16, 19-26, 28-30, and 32-49 are currently pending in the application.

The amendments to independent Claims 16, 28, 29, and 30 clearly place the present application in condition for allowance, and for this reason entry of these amendments and allowance of all claims is respectfully requested.

Each issue raised in the Office Action mailed on August 5, 2005 is addressed hereinafter.

II. REJECTIONS BASED ON THE CITED ART

A. INDEPENDENT CLAIM 16

Independent Claim 16 has been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Venkatachary et al., U.S. Patent No. 6,212,184 ("VENKATACHARY") in view of Douceur et al., U.S. Patent No. 6,041,053 ("DOUCEUR").

Among other features, Claim 16 includes:

> ...
> looking up information in the header of said data packet in an expanded M-trie data structure, wherein **said expanded M-trie data structure** is organized as a multi-level tree including a root node, inferior nodes, and terminal nodes, **wherein each node stores values for an address and an opcode**, wherein **said opcode specifies:**
> **a particular field of a plurality of fields in the header of said data packet;**
> **and**
> **an operation that is to be performed on the data stored in said particular field, wherein said operation is one of a plurality of operations that said opcode can specify;**
> ...

Claim 16 has been amended herein to clarify that the operation specified in an opcode is one of a plurality of operations that can be specified in an opcode. Thus, in Claim 16 a node in an extended M-trie data structure is capable of indicating the performance of a plurality of different operations by storing, IN THE NODE, a value for an opcode that specifies one operation of the plurality of operations. In other words, as recited in Claim 16, a different operation may be performed at each node of the M-trie data structure.

In contrast, in VENKATACHARY there is no teaching or suggestion of storing any information in the nodes, which information to indicate that a node is capable of performing a plurality of operations. Moreover, VENKATACHARY does not teach or suggest that the gird-of-tries structures are used for any operation other than comparing values. For this reason, Claim 16 clearly overcomes the teaching of VENKATACHARY.

Furthermore, Claim 23 recites in more narrow language some of the different operations that can be specified in an opcode, such as, for example, demultiplexing, matching, and hashing. Thus, no new search is required for examining of the feature of Claim 16 of **wherein said operation is one of a plurality of operations that said opcode can specify**. For this reason, entry of the amendment to Claim 16 is proper and such action is most earnestly solicited.

VENKATACHARY does not describe the feature of Claim 16 of an extended M-trie node that stores values for an address and an opcode, wherein said opcode specifies a particular field and an operation that is to be performed on the data stored in the particular field, wherein the operation is one of a plurality of operations that the opcode can specify.

The previous Office Action mailed on April 12, 2005 asserted that the PT or SP pointers in the VENKATACHARY gird-of-tries correspond to the opcodes featured in Claim 16. The present Office Action, however, does NOT maintain this assertion. Instead of

identifying as practically as possible, as required by MPEP §707 (see also 37 C.F.R. §1.104(c)(2)), what in VENKATACHARY corresponds to the opcodes featured in Claim 16, the present Office Action recites the passage in col. 9, line 59 to col. 10, line 33 of VENKATACHARRY in a broad and an un-specific way.

The present Office Action is absolutely silent on what exactly in VENKATACHARY corresponds to the opcodes of Claim 16. Specifically, in page 2, numbered paragraph 2, the present Office Action states:

> In Venkatachary, each node specifies a field in the header of the packet, i.e. a source or destination address, since each node is directed to a specific field in the header (col. 9, line 59 – col. 10, line 33). In addition, **VENKATACHARY discloses that, in each node, the specified field is compared to a value stored in the node** in order to determine if a lowest cost match for a filter has been found (col. 9, line 59 – col. 10, line 33). This comparison is "an operation that is to be performed on the data stored in the particular field." [as featured in Claim 16]. (Emphasis added.)

This assertion is incorrect. First, VENKATACHARY defines a trie as "a binary branching tree with each branch labeled 0 or 1." (VENKATACHARY, col. 14, lines 30-31.) Further, as can be clearly seen in FIGs. 8, 11, and 12, the nodes in VENKATACHARY do NOT even store the bits associated with the branches of the tree; rather, the **branches** are associated (i.e. "labeled") with 0s or 1s. Thus, contrary to the assertion in the Office Action, VENKATACHARY does not disclose that in each node the specified field is compared to a value **stored in the node**.

Specifically, VENKATACHARY states that the combination of several header fields, such as destination address, source address, and application port numbers is called a filter. (Col. 5, lines 29-32.) Further, in VENKATACHARY, the combination of the fields for a particular filter are **mapped** to a grid of tries. The value of each field in the filter, such as a source or destination prefix in a packet header, is stored in one trie of the grid. "**The prefix**

associated with a node u is the concatenation of all the bits from the root to the node u." (Col. 14, lines 31-33, emphasis added.) "In FIG. 8, for instance, the leftmost node in the Dest-Trie has prefix value 00; the node on the right has value 10." (VENKATACJARY, col. 14, lines 40-42.) Thus, in VENKATACHARY a particular filter value (which may correspond to a particular field in a packet) may be associated with a particular node in a trie. However, the value to which the particular filter value is compared is NOT stored in a node; rather that value is the **concatenation of all bits associated with the branches** between the root node and the particular node. For this reason, the nodes in the VENKATACHARY tries cannot possibly correspond to the extended M-trie nodes that **store** values for an address and an opcode, as featured in Claim 16.

Second, the passage in col. 9, line 59 to col. 10, line 33 of VENKATACHARY does NOT support the assertion in the Office Action that VENKATACHARY describes a trie node that is capable of storing a value for an opcode. In col. 9, line 59 to col. 10, line 33 VENKATACHARY states:

> There is thus provided, in accordance with a first embodiment of the invention, a basic method for routing a data packet through an electronic routing device having an input data link and a plurality of output data links, the data packets having at least a first field and a second field, the method comprising: searching a first trie in a memory of the electronic routing device for a record containing a longest prefix match of a first field of the data packet, searching a second trie associated with the longest prefix matching record of the first trie for a record containing a lowest cost match of a second field of the data packet; and routing the data packet on an output data link corresponding to the lowest cost matching record. In accordance with a refinement of the method, the first trie may be a multi-bit trie.
> There is provided, in accordance with a second embodiment of the invention, in which each record of a first trie corresponding to a prefix match of a first field of a data packet references an associated second trie containing only records corresponding to filters exactly matching the prefix match of the first field, a method comprising: (a) searching a first trie in a memory of the electronic routing device for a record containing a prefix match of a first field of the data packet, the record also containing a reference to an associated one of a plurality of second tries; (b) searching the associated second trie for a

> record containing a minimum cost match of a second field of the data packet, the record containing a reference to one of the output data links; (c) repeating steps (a) and (b) until all of the matching prefixes in the first trie and the corresponding minimum cost matches of the second field of the data packet are found; (d) selecting the lowest cost match of the minimum cost matches; and (e) routing the data packet to the output data link corresponding to the lowest cost match. In accordance with an important variation of this embodiment, in which the repeating step comprises backtracking up the first trie, and at least one of the second tries (T2A) associated with a record (R1) in the first trie comprises at least one record containing a switch pointer pointing to a second trie (T2B) having a top record associated with ancestor record (R2) in the first trie, there is provided a method wherein the step of backtracking up the first trie comprises following the switch pointer from trie T2A to trie T2B.

The above passage generally tracks the language of claims 1-2 and 5-6 in VENKATACHARY. While the above passage may be describing methods for routing data packets based on searching tries, the above passage does NOT describe that each node in the trie STORES value for an opcode, wherein the opcode specifies a particular field of a plurality of fields in the packet and an operation to be performed on the data stored in the particular field, as featured in Claim 16.

For the above reasons, VENKATACHARY does not describe, teach, or suggest the feature of Claim 16 of **an extended M-trie node that stores values for an address and an opcode, wherein said opcode specifies a particular field and an operation that is to be performed on the data stored in the particular field, wherein the operation is one of a plurality of operations that the opcode can specify**.

Further, the Office Action does not assert that DOUCEUR teaches, describes, or suggests this feature of Claim 16. Thus, any combination of VENKATACHARY and DOUCEUR necessarily fails to describe, teach, or suggest all features of Claim 16. For this reason, Claim 16 is patentable under 35 U.S.C. § 103(a) over VENKATACHARY in view of DOUCEUR. Reconsideration and withdrawal of the rejection are respectfully requested.

B. INDEPENDENT CLAIMS 28, 29, AND 30

Independent Claims 28, 29, and 30 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over VENKATACHARY in view of DOUCEUR.

Independent Claims 28, 29, and 30 include features similar to the features of Claim 16 discussed above. For this reason, Claims 28, 29, and 30 are patentable under 35 U.S.C. § 103(e) over VENKATACHARY in view of DOUCEUR for at least the reasons given above with respect to Claim 16. Reconsideration and withdrawal of the rejections are respectfully requested.

C. DEPENDENT CLAIMS 19-26 AND 32-49

Claims 19-20, 32-33, 40, and 45 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over VENKATACHARY in view of DOUCEUR. Claims 21-22, and 34-35 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over VENKATACHARY in view of DOUCEUR, and further in view of Chiu et al., U.S. Patent No. 6,385,170 ("CHIU"). Claims 23-24, 26, 36-37, and 39 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over VENKATACHARY in view of DOUCEUR, and further in view of Onishi et al., U.S. Patent No. 5,434,863 ("ONISHI"). Claims 25 and 38 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over VENKATACHARY in view of DOUCEUR, further in view of ONISHI, and further in view of CHIU. Claims 41-44, and 46-49 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over VENKATACHARY in view of DOUCEUR, and further in view of Wilford et al., U.S. Patent No. 5,509,006 ("WILFORD").

Each of Claims 19-26 and 32-49 depends from one of independent Claims 16, 29, and 30, and thus includes each and every feature of its corresponding independent claim. Furthermore, in rejecting Claims 19-26 and 32-49 the Office Action relies explicitly on

VENKATACHARY and DOUCEUR, and not on any of the other references (CHIU, ONISHI, and WILFORD), to support prior disclosure of the features discussed above with respect to Claims 16, 29, and 30. Thus, since as shown above VENKATACHARY and DOUCEUR fail to teach all features of Claims 16, 29, and 30, any combination of VENKATACHARY and DOUCEUR with the other references necessarily fails to teach all features of dependent claims 19-26 and 32-49. Therefore, each of claims 19-26 and 32-49 is allowable for the reasons given above for Claims 16, 29 and 30. In addition, each of Claims 19-26 and 32-49 introduces one or more additional features that independently render it patentable. However, due to the fundamental differences already identified, to expedite the positive resolution of this case a separate discussion of those limitations is not included at this time. Therefore, it is respectfully submitted that Claims 19-26 and 32-49 are allowable for the reasons given above with respect to Claims 16, 29, and 30.

III. CONCLUSION

The Applicant believes that all issues raised in the Office Action have been addressed. Further, for the reasons set forth above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a formal Notice of Allowance is believed next in order, and that action is most earnestly solicited.

The Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.

To the extent necessary to make this reply timely filed, the Applicant petitions for an extension of time under 37 C.F.R. § 1.136.

If any applicable fee is missing or insufficient, throughout the pendency of this application, the Commissioner is hereby authorized to charge any applicable fees and to credit any overpayments to our Deposit Account No. 50-1302.

Respectfully submitted,
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